

Herbivore Damage to Ferns Caused by a Chrysomelid Beetle from Lower Gangetic Plains of West Bengal, India

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ABSTRACT.—This paper records the occurrence of a polyphagous beetle, *Schenklingia bhaumiki* (Coleoptera: Chrysomelidae), feeding on ten fern species growing in the Lower Gangetic Plains of West Bengal, India viz., *Christella dentata*, *Ampelopteris prolifera*, *Cyclosorus* sp., *Pteris vittata*, *Nephrolepis cordifolia*, *N. exaltata*, *Adiantum philippense*, *Drynaria propinqua*, *Pyrrosia adnascens* and *Phymatosorus scolopendria* for the first time. The adult beetles are leaf surface scraper and skeletonize the lamina. The larvae are leaf miners and produce linear–blotch mines between the epidermal layers with continuous spiral black frass. Young leaves of all ten species of ferns are significantly less damaged than mature ones indicating that both the adults and the larvae attack leaves of all ages. Herbivore damage of the beetle infested ferns ranged from 1.94% to 25.47% and 2.68% to 54.86% for scraping feeding and mining feeding respectively. Among the host ferns, the members of Thelypteridaceae viz., *Christella* (Scraping feeding 25.47%; mining feeding 54.86%), *Ampelopteris* (Scraping feeding 24.10%; mining feeding 53.60%) and *Cyclosorus* (Scraping feeding 16.06%, mining feeding 27.12%) suffered maximum herbivore damage. Interspecific variation of plant size and biogeographic range of the fern species are not related to herbivore damage. Insects may perhaps attack fewer ferns than angiosperms, but there is no evidence that ferns are generally less damaged than angiosperms.

Pteridophytes, especially ferns in a broad sense, are among the most primitive land plants and are generally considered to be difficult plants for herbivores to exploit (Eastop, 1973; Hendrix, 1977, 1980; Cooper-Driver, 1978; Soo Hoo and Fraenkel, 1964; Kaplains *et al.*, 1967). This underutilization of ferns by herbivores has been attributed to host resistance factors such as texture (Soo Hoo and Fraenkel, 1964), toxins (Muenscher, 1939), amino acid deficiency (Smith and Agiza, 1951), poor nutritional composition (Moon and Pal, 1949), and the presence of cyanogens (Lawton, 1976) and thiaminase (Somogyi, 1949). Although it has also been suggested by Auerback and Hendrix (1980), Balick *et al.* (1978) and Gerson (1979) that this assumption may not be well founded and may be due to less documentation of herbivory on ferns. Fossilized ferns showing damage attributed to herbivores are known from the Carboniferous (Smart and Hughes, 1973) to the Upper Triassic (Ash, 1999, 2000). Recent work on fern herbivory, however has revealed that a fairly large number of insects of different groups efficiently utilize fern hosts for their growth and development (Mound, 1967; Room *et al.*, 1981; Ottosson and Anderson, 1983; Lawton and MacGarvin, 1985; Mohan-Daniel and Chandrasekar, 1986; Misra *et al.*, 1986; Kraus *et al.*, 1993; Bera *et al.*, 1994; Bera and Ghorai, 1995a, b, 1997a, b, 1999a, b; Gilman and Cooper-Driver, 1998; Pemberton, 1998; Patra and Bera, 2002; Bera *et al.*, 2003; Mehltreter and Tolome, 2003, Barker *et al.*, 2005). The objective of this study was to contribute new data to the field of insect-fern interactions and to demonstrate that